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ABSTRACT

The skills needed to do well in life are different from the skills needed to do well in school. Bringing the skills needed for life and work into the curriculum and pedagogy of high schools is one of the major challenges of this era of school reform. Drawing on examples of effective teaching and learning, this book addresses the question of how educators can construct schoolwork to be more like real work. The book is organized in three chapters. The first chapter portrays two different yet complementary approaches used by school-to-career reformers to situate learning in real-world contexts and to give high school students opportunities to learn in the company of adults. Taken together, field-based investigation and internships constitute a broadened definition of work-based learning. Chapter 1 describes what each of these approaches looks like in practice, offering a sampling of tools that other schools and partnerships could use and discussing some of the challenges involved. Chapter 2 offers a framework for teachers to use in developing high quality student projects. Portraits of several schools illustrate what this framework looks like in practice. Chapter 3 looks at what is involved in schools becoming more open systems, working in concert with parents, community, and business partners to create rich learning experiences both inside and outside the classroom. The key role of both policy and professional development is discussed in relation to meeting quality standards. An appendix provides sample project tools and templates. (KC)

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Doing

Connecting Learning & Work

Lili Allen
Christopher J. Hogan
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Jobs for the Future

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Knowing and Doing:

Connecting Learning & Work

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Knowing and Doing:

Connecting Learning & Work

by

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Christopher J. Hogan
Adria Steinberg

Jobs for the Future
LAB

Northeast and Islands Regional Educational Laboratory At Brown University

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Introduction

When people are asked to describe a meaningful learning experience that had a significant impact on their adult lives, some reach back to a particularly inspiring teacher or course in school or college, but many others offer examples of experiences they had outside of school—working, participating in an artistic creation, or doing community work. A number of characteristics distinguish such experiences, such as intellectual curiosity sparked by a need to know, creative energies and productivity, the opportunity to work alongside experts or professionals, and the challenge of meeting real standards of accomplishment.

Doing well in school usually involves learning to answer questions and carry out assignments developed by the teacher. Students struggle to come up with correct responses on tests—usually in an artificial situation in which they are expected to work alone, without colleagues, reference materials, tools, or technology to aid their thought. Yet doing well in life requires a very different set of skills—framing questions, planning, organizing, finding and analyzing information, working with others, assembling key resources and tools, testing out ideas, and trying again.

Bringing such characteristics and skills inside the curriculum and pedagogy of the high school is one of the major challenges of this era of school reform. Drawing on examples of effective teaching and learning, this report addresses the question of how educators can construct schoolwork to be more like real work.

How Students "Get Smart"

Over the past century in American education, the term "applied" has become synonymous with watered-down academics, offered to reluctant or resistant students as a substitute for the college preparatory curriculum. "Academic rigor," on the other hand, has become equated with the coverage of increasingly abstract topics or concepts. In the early years of this century, John Dewey warned educators to beware of setting up a false dichotomy between "head" and "hand." He called instead for situating learning in the vocations of adult life, whether professions or trades, academics or the arts. The most powerful learning would come, he believed, from combining the intellectual and the practical. In his estimation, using knowledge, or "intellectualizing" practical activities, would enable students to develop a deep understanding of important concepts and ideas.

Building on Dewey's work, cognitive psychologists like Lauren Resnick and Howard Gardner are contributing to the theory and research supporting applied, contextual learning. Drawing on the theory of multiple intelligences, research on the elaborate working memory programs constructed by the brain, and studies of thinking both in and out of school, Gardner and Resnick conclude that intelligence cannot be considered apart from the purposes for which it is used. Intelligence, in its multiple forms, is something students can

"get" or develop over time, rather than being an innate characteristic. According to this theory, it is in learning to solve problems and create products valued by the society that people become more intelligent.

A picture of what such theories might look like in practice is emerging from the efforts of schools, districts, and communities engaged in school-to-career reforms.[1] These communities have rejected the misconception that school-to-career is simply about "getting jobs for kids" or "doing something for the non-college bound." Rather, school-to-career encompasses a set of key practices that defines a more contextualized approach to curriculum, assessment, and pedagogy and an easier transition to the adult world of learning and work for *all* students. This set of practices includes:

- using real-world contexts to teach rigorous academics, with an emphasis on higher-order thinking skills
- expanding academic instruction to include problem-solving and other cross-cutting competencies vital to further study and future careers
- extending learning beyond the classroom through work internships, field-based investigations, and community projects linked to academics
- providing students with adult mentors and coaches for project work
- emphasizing high-quality student products through regular exhibitions, portfolios, and other assessments, informed by real-world standards
- offering regular opportunities for students to explore their interests and develop personal plans for future learning and work

Such practices define a school where learning is both rigorous and applied. At its best, this approach to education fosters the diligence

and creativity of craftsmanship, without a particular craft or trade outcome in mind, and the disciplined inquiry of scholarship, without a narrow focus on arcane studies.

The most important factor in a school's ability to put this vision into practice is the involvement of a broad community of adults in the learning experiences of young people. This is by no means standard practice in our schools. For most of this century, what students have been expected to do in school has been dissociated from the life and work of the community in which they live. Unlike the last century, when young people participated in the farming, small businesses, and trades of their family and neighbors, the work of adults has become largely invisible to today's young people. There are few, if any, opportunities to work alongside adults, or to be taken seriously in an enterprise worthy of adult concern.

Summary of Chapter Contents

The first chapter portrays two different, yet complementary, approaches used by school-to-career reformers to situate learning in real-world contexts and give high school students opportunities to learn in the company of adults. Taken together, field-based investigation and internships constitute a broadened definition of work-based learning. Chapter I describes what each of these approaches looks like in practice, offering a sampling of tools that other schools and partnerships could use and discussing some of the challenges involved.

Any attempt to situate teaching and learning in real-world contexts implies, of course, a need to reconsider organizational as

well as pedagogical features of traditional high schools. Chapter II offers a framework ("the Six As") for teachers to use in developing high quality student projects. Portraits of several schools illustrate what this framework looks like in practice. Additional sample templates can be found in the appendix. Chapter III looks at what is involved in schools becoming more open systems, working in concert with parents, community, and business partners to create rich learning experiences both inside and outside of the classroom. The key role of both policy and professional development is discussed in relation to meeting quality standards.

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I

Situating Learning in Real-World Contexts

How can high school students gain access to the adult world of learning and work? Educators and employers at the cutting edge of school-to-career reforms rely on two major approaches: field-based investigation and internships. This chapter provides examples of these two approaches and highlights their main features. The first approach—**field-based investigations**—moves from inside the school out, transforming classroom studies by engaging students in extended projects that involve fieldwork and contact with adults who have expertise in the area of study. The second approach—**internships**—begins with work placements outside of school, maximizing the learning potential by structuring internships around learning goals and projects that emphasize the development of research, literacy and technical skills, as well as the possibility of other content-based academic connections.

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These approaches involve a significant departure both from school as most teenagers know it and from work as many teenagers experience it. Below, we highlight the features that serve as quality criteria for both field-based investigations and internships. These features distinguish such work-based learning experiences from conventional schooling and traditional work placements.

- Experiences are structured around learning goals agreed to by students, teachers, and partners, and that assist students in reaching school and district standards.
- Students carry out projects that are grounded in real-world problems, take effort and persistence over time, and result in the creation of something that matters to them and has an external audience.
- Students receive ongoing coaching and expert advice on projects and other work tasks from employers and community partners. By learning to use strategies and tools that mirror those used by experts in the field, students develop a sense of what is involved in accomplished adult performance and they begin to internalize a set of real-world standards.
- Students develop a greater awareness of career opportunities in the field and deepen their understanding of the educational requirements of those careers.
- Students develop their ability to use disciplinary methods of inquiry (just as scientists do) and enhance their capacity to tackle complex questions and carry out independent investigations.
- Students are able to demonstrate their achievements through multiple assessments, including self-assessment, specific performance assessments (e.g., an oral proficiency exam), and exhibitions.

This first section will focus on field-based investigations, ranging from short-term, single classroom projects in one school to a school

that has reorganized itself to promote more contextualized learning for a large portion of the student body. The second section will focus on internships, offering examples of a large-scale internship initiative featuring learning plans and a smaller-scale internship initiative centering around senior projects.

Following each example, a highlight section reviews the degree to which the project demonstrates the criteria that support high-quality work-based learning. Both sections end with a brief discussion of design considerations for teachers and schools seeking to create their own field-based investigations or internships.

FIELD-BASED INVESTIGATIONS

In recent years, work by cognitive scientists on how people learn has led to renewed interest in project-based learning. Field-based investigations represent a particular kind of project, grounded in a real problem. They enlist the expertise of working professionals and community members, who introduce students to the real-world standards for this type of work.

Noble High School's Water Quality Testing Project

At Noble High School in Berwick, Maine, students in freshman and sophomore science classes complete a variety of water-quality testing projects. All students are trained by the Wells Reserve Coordinator to collect water samples and test them for chlorophyll, fecal coliforms, and dissolved oxygen. During monthly site visits, students monitor chemical levels and add to the database kept by Wells

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Reserve. Students also conduct data analysis on their findings in their math class. After several years of operating the project, Wells Reserve staff have trained a few students as chief lab technicians and charged them with the responsibility of assisting in training other students. Wells Reserve personnel also assess the students' work at the laboratory, which must meet quality standards to be included in the system's database. Students have presented their findings to town meetings, with Wells Reserve volunteers in attendance.

Every year science students also get the option to complete another water-quality testing project of their choice. One year, students wanted to determine why their local swimming hole was often clogged with algae. After collecting samples from the river, visiting the local sewage treatment plant, and consulting with community professionals such as water-testing scientists, students presented their findings to residents and politicians at a local town meeting and called for more rigorous treatment of sewage entering the river above the swimming hole.

HIGHLIGHTS

Students have the opportunity to select a project about which they are genuinely concerned.

Students deepen their understanding of science and mathematical concepts and processes by applying them to a real-world problem.

Student work is put to genuine use. Wells Reserve volunteers rely on students' input to complete the system's database.

Part of their assessment is similarly "real" as they present their findings to water-quality technicians and, in some cases, to town officials for community action.

Students learn technical skills from water-quality technicians. As students' skill levels increase, their responsibilities increase accordingly.

Milwaukee Trade and Technical High School's Lead Paint Testing Project

The 16 students in Milwaukee Trade and Technical High School's lead paint project are juniors in organic chemistry and biochemistry, which is the second of three years of chemistry courses in the school's manufacturing cluster. In this two-week project, students learn the techniques of lead testing and analysis and then guide elementary school students in the identification and analysis of lead paint samples from their homes. A neighborhood health center subsequently uses the students' positive lead test results to identify neighborhoods with high lead paint levels, and educates residents from those neighborhoods in a community meeting regarding the hazards of lead exposure, health center services, and the lead abatement process. Through this project, students learn basic solution chemistry, apply their learning through the analysis of paint chips, develop the skills to fully communicate their knowledge to younger students, and learn that their actions can have an impact on the health and well-being of others.

HIGHLIGHTS

High school students learn to communicate complex information while gaining hands-on experience in chemistry, thereby deepening their own understanding of chemistry and making a real contribution to public health.

The project has two external audiences: elementary school students, who learn about community health concerns; and the neighborhood

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health center, which uses student products (lead tests) to inform community health measures.

Part of the assessment process includes evaluation of student performance in their roles as teachers and activity leaders.

Fenway Middle College High School's Work Partnership with CVS Pharmacy

Fenway Middle College High School in Boston has 240 students grouped into three houses, each of which is affiliated with a business. The 80 students in each house take common classes from their freshman through their senior years. Freshmen in the house connected to the CVS pharmacy stores hear presentations by CVS employees on health issues in their biology class. Sophomores cycle through rotations with store managers once a month and do problem-solving activities in all their academic courses related to health, pharmaceuticals, and consumer awareness.

When students have completed two years of high school courses, they must demonstrate academic progress through a process known as "junior review," which serves as an assessment vehicle to determine the structure and content of each student's remaining time at Fenway. Junior review also serves as a preparation for the culminating academic experience at Fenway, which includes what they call "senior institute," consisting of seminars, advanced course work, a senior internship, a major research paper, a senior project, and the completion of a graduation portfolio.

For their junior review, the 18 juniors in the CVS house work side-by-side with employees from the CVS corporation to conduct an in-depth market analysis to determine where to locate a new CVS

pharmacy and retail outlet in Boston neighborhoods. Organized into small work teams supported by experts from various departments within the CVS organization, students analyze demographic and economic data to determine market demand for a CVS pharmacy in these neighborhoods. Students also work with CVS staff to identify and evaluate several possible locations for the new store. This involves visits to sites to analyze first-hand the pros and cons of possible locations. Students work with architects on design options for the new store and work with accountants on financing plans.

The project is integrated into the students' mathematics and humanities classes. Students use statistical methods to organize and analyze the demographic data they collect, use mathematics to develop and analyze the financing options and likely return on investment, and present their preliminary findings to their peers in their mathematics and humanities classes. Students hone their writing skills through the preparation of a report summarizing their findings and recommendations and develop public-speaking skills through presentations of their findings to CVS executives in the spring. Corporate executives are given the rubric developed for the senior project to assess the students' presentation. Their academic work is assessed by classroom teachers: Did they properly use citations? Is their written work of high quality? The project report and related materials are included in the students' junior review portfolio, which is used to assess the students' progress towards graduation requirements.

CVS staff from relevant departments meet with students once or twice a month for the duration of the project to scrutinize their

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work and give feedback. For example, CVS personnel involved in site selection meet with the student "real estate group" to assess their demographic analysis and coach students on their demographic projections. In addition to providing experts to coach and mentor students on various aspects of the project, CVS offers students several opportunities to shadow employees in corporate headquarters and in the retail stores. This helps students gain a more complete understanding of the business and career paths in the science and health fields. CVS representatives also serve on the Fenway Middle College High School Board of Trustees.

HIGHLIGHTS

Students participate in simulated CVS site selection, making the project "real enough" because students see that their ideas are taken seriously by professionals in the company, especially since their project activities are similar to the ones undertaken by adults.

CVS personnel are involved in all stages of the project, from coaching to job shadowing to assessment, grounding the project in real-world concerns.

Students become familiar with a number of different careers and job opportunities within a major corporation.

DISCUSSION TOPICS

Project Duration and Scope, Involvement of Outside Partners, Impact on Student Learning

Each of the examples offered in this section on field-based investigation meets most if not all of the criteria for high-quality work-based learning. At a minimum, students engage in solving real-world problems through which they engage in a combination of research,

writing, and presentation. But there are also important differences among the projects in such dimensions as the scale or scope of the field-based investigation, the degree to which it is integrated into one or more academic courses, and the level of involvement of outside partners. Looked at together, these projects highlight the degree to which schools face an inevitable trade-off between ease of implementation and the breadth and depth of impact on student learning.

Project Duration and Scope

Milwaukee Tech, Noble, and Fenway represent three points on a continuum from short-term, single-classroom projects that function as a replacement unit to long-term, whole-school projects that require a reorganization of the curriculum. The chemistry teacher at Milwaukee Trade and Technical High School leaves the school's chemistry curriculum largely intact by taking only two weeks for a self-contained project relevant to one topic area of chemistry. The 9th- and 10th-grade integrated science teachers at Noble High School, on the other hand, use the theme of water quality, as well as other project themes, to organize major portions of their curriculum. This approach necessitates a great deal of planning, both to figure out how to use field-based investigations to cover the necessary course content, and, possibly, to make choices about what content will not be covered.

Pressure to cover a particular set of topics within a course and the absence of time outside of class to do curriculum development are two factors teachers often cite as barriers to developing more

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frequent and longer field-based investigations for their students. One way that schools such as Noble High have found to overcome these obstacles is to establish projects that can be continued—with perhaps a somewhat different focus each time—over a number of years. By the third or fourth cycle through a project, teachers face much less logistical and curriculum development work. By now, for example, Noble teachers have figured out a great deal about how to use the water-quality project to teach particular concepts of ecology, earth science, biology, and chemistry.

The CVS project at Fenway integrates relevant topics across three academic classrooms over an entire year. Through common planning time, teachers brainstorm specific ways to dovetail the project with their academic disciplines. As a result, students progress through a logical sequence of academic activities that support their fieldwork. For example, students in a math class study a range of statistical methods before choosing the approach most appropriate for demographic analysis. Teachers in all classes can also build in regular "checkpoints" to ensure that students are completing necessary tasks. Because the entire school is organized around the goal of offering sustained applied learning opportunities in a real-world context, the junior review project is not seen as conflicting with ongoing academic work, but rather as enhancing it.

In addition to supporting teachers to move forward with this type of learning, some districts collaborate with business partners to offer a "pull-out" version of a field study. For example, in North Clackamas, Oregon, several major companies agree to assign real problems to students specially trained in "total quality manage-

ment." Following a two-day workshop on problem-solving techniques and basic principles of quality improvement, teams of students from three high schools are assigned a work-related problem at a sponsoring employer site. Over a five-day period, these students are released from their regular classes to gather and analyze data, interview employers, develop possible solutions, and present a plan to management for reducing or eliminating the problem. For example, Northwest Natural Gas asked a team to reduce the inconsistency in the way invoices are processed, and Regency Blue Cross and Blue Shield wanted a better process for responding to requests for software.

This approach allows a district to move forward with this type of learning without necessarily having the "buy-in" of academic faculty. While this may make it easier to implement initially, it means that only a relatively few students have the experience of being immersed in a high-stakes problem-solving effort, and that, even for those students, the academic connections are not transparent. Furthermore, these students are pulled out from their regular classes—causing some disruption to the teacher and other students in those classes. Ultimately, the value of such "pull-out" experiences may be in establishing the feasibility and desirability of field-based investigations within schools or districts that are not yet in the position to integrate such an approach into the classroom.

Involvement of Outside Partners

By definition, field-based investigations involve community or work-site partners outside of the school. Establishing and maintaining

these relationships require both initial outreach and ongoing attention to communication. It is difficult for individual teachers to carry out such functions. Even seemingly simple tasks, such as reaching a partner by phone, can become obstacles in school buildings in which teachers do not have access to phones.

As a result, some teachers adopting project-based approaches tend to minimize the involvement of outside partners. For example, in Milwaukee Tech's lead paint project, the role of the community health center is fairly limited. It was originally responsible for connecting the high school teacher with the elementary school teacher. While the community health center staff were recipients of information generated by students, they did not interact with students in an ongoing way throughout the process.

With support from a school-based career internship coordinator, the partnership of Noble High science teachers with the Wells Reserve is somewhat more institutionalized. It is established that students will learn water testing procedures from expert technicians who will monitor the quality of their work and then make use of the data they collect. Although such a partnership requires more maintenance than a more limited connection, it also results in more learning resources for students.

When field-based investigation becomes part of a whole-school model of reform, such as at Fenway, the possibility exists for involving partners even more directly in the learning process. During the junior review project process, CVS personnel play a significant role in helping students both define and accomplish their projects. As we have seen, Fenway organizes students into work teams,

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supported by relevant experts; this process organizes employer participation as well. It also raises the stakes: students regularly share their work with professionals, who provide ongoing feedback; and at the final presentation to CVS executives, students understand that they are being judged by real-world standards.

Impact on Student Learning

All of the examples cited here offer a combination of traditional academic content and skills, and applied learning skills—or, as many schools now call them, the SCANS competencies.[2] These projects are also good examples of how teachers and schools can help students develop key life-long learning skills, while also reinforcing important habits of mind. The Noble students, for example, are called upon to integrate findings from several types of research: their own water quality testing results, their interviews with experts in the field, and their review of relevant literature. Engaging in such a project, students can learn to sift through various kinds of evidence, to learn from mistakes and be persistent, and to think about how they can use their work to make a contribution.

At the same time, particularly in the more extended projects, there are opportunities to practice important literacy skills. Because these projects require some form of presentation, students gain communication skills. For example, the Milwaukee Tech students translate technical and scientific information for young children, while Noble students describe the implications of their findings to town officials, and Fenway students report their results to CVS management. In addition, projects like these, with appropriate

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scaffolding on the part of the teacher (discussed in detail in Chapter III), give students experience tackling semi-structured problems and working together in problem-solving teams—learning opportunities that are absent in traditional schoolwork.

In all three high schools, the project becomes a vehicle for teaching valued academic content matter, although, as discussed earlier, the scope of this integration ranges from a short unit in a single subject to a year-long project involving all of the juniors and their core academic subjects in a particular part of the school. Certainly there is no easy resolution to the tension between breadth and depth. Projects, even relatively modest ones such as the lead paint project, take time. Rushing through a project, or assigning it as homework, as many teachers do, greatly lessens its impact. If a project heightens students' need to know or their interest in aspects of the subject matter, it takes time and focus to make these academic connections. If a project requires research, or visual or written presentation, teachers need to take the time to teach the skills involved in doing this work well, and not just assume that students already know how to do it.

As long as people think of projects in terms of time "taken away" from the regular curriculum, they will exist marginally, if at all. Such projects take hold when people recognize that this type of work helps students deepen their understanding of what is in the curriculum. This is possible when students apply what they learn and make it their own. Applied learning experiences help students develop vital life-long learning skills that otherwise would remain outside of the curriculum altogether.

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INTERNSHIPS

Students in internships spend significant time over the course of a semester or a year in a work placement through which they develop technical skills and work-related competencies, receive coaching from workplace supervisors, and gain knowledge of broad occupational areas. Internships allow students to learn about "all aspects of an industry" and develop broad, transferable skills, as well as particular technical skills related to the job. Strategies for integrating classroom and internship work experience include learning plans, which identify the specific skills that students should gain in a workplace setting, and internship-related projects, through which students conduct independent research on a topic generated during their internship. These two options are not mutually exclusive. Many internship programs organize placements around learning plans and also integrate project work throughout. This vastly increases the possibilities for student learning.

Internships with Learning Plan: ProTech Youth Apprenticeship Program

ProTech, which began in Boston in 1991 as a youth apprenticeship program targeting specific health care occupations at local hospitals, now encompasses five broad industry clusters: health care, financial services, telecommunications and utilities, environmental engineering and services, and business services.

ProTech involves students from a number of Boston high schools with career pathways. In their freshman and sophomore years (the "pre-ProTech" phase of the program), students are

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clustered with common teachers in core academic courses and industry-related electives. Students in good academic standing may enter ProTech in the junior year. In school, ProTech juniors and seniors are clustered into ProTech-specific courses related to the occupational theme as well as in selected science and English courses. Teachers meet as a team and determine ways to connect students' academic learning to the broad industry area of the career pathway.

In the late fall and winter of their junior year, all ProTech students are provided brief, unpaid "rotations," which form the basis for matching students with employers for part-time employment in the spring semester. The students continue their paid work experience full-time through the summer and part-time during the following school year. Employment continues after graduation on a case-by-case basis, by specific agreement between employer and student.

In their work-based placements, students are expected to learn 11 **competencies**. These consist of broad, transferable skills that will allow them to succeed in multiple occupations within, or even beyond, their ProTech industry cluster. These competencies are close to the SCANS skills in their emphasis and are used in creating learning plans for each work site (see list of competencies on next page).

The learning plan is developed by employers, in consultation with teachers and students. Working from the list of competencies provided by ProTech staff, a supervisor writes a job description that includes specific tasks and objectives for a student. At the school, the teacher reviews the learning plans of students in a class and designs curricula to further help students attain competencies.

ProTech staff indicate that the learning plans stimulate conversation between teachers, supervisors, and students about learning goals, and encourage students to take responsibility for their own learning. As demonstrated in Maisha's experience (see page 30), students can track their progress towards achieving the competencies and identify areas where they need further development.

Recently, participating teachers and employers have begun to design and implement assessment rubrics that will assist supervisors in evaluating individual students' performance more consistently across the 11 competencies. The learning plan's new rubric will be a powerful source of data for student performance measurement, to be included with more traditional data on grade point averages and standardized tests.

11 Competencies for Success in Careers and School

1. Communicate and understand ideas and information.
2. Collect, analyze and organize information.
3. Identify and solve problems.
4. Understand and work within complex systems.
5. Use mathematical ideas and techniques.
6. Use technology.
7. initiate and complete activities.
8. Act professionally.
9. Interact with others.
10. Learn and teach on an ongoing basis.
11. Take responsibility for career and life choices.

STUDENT LEARNING PLANS

Maisha's supervisor asked her to complete several clerical tasks in her internship at the bank, including organizing file drawers, providing telephone support, and converting attendance reports from one software system to another. Maisha's largest project was to update the bank's User Support Manual, allowing her to practice and gain several of the 11 key competencies: #1–communicate and understand information, #2–collect, analyze, and organize information, #4–understand and work within complex systems, #6–use technology, #7–initiate and complete activities, and #9–interact with others).

Her learning plan gave her supervisor an opportunity to assess her progress towards achieving these competencies, ranking her performance in each competency as: extremely effective, very effective, effective, needs development to be effective, or ineffective. For example, her supervisor found Maisha to be effective at using technology and acting professionally, but found that she needed to improve her ability to understand and work within complex systems—by asking more questions and by taking more initiative to seek information from various information sources at the bank regarding bank structure and policies.

HIGHLIGHTS

Learning plans are developed together by employers, students, and teachers.

Students perform and are evaluated on real work tasks.

Initial rotations and in-depth placement in an internship ensure that students are exposed to a variety of career opportunities in the field.

Assessment rubrics involve partners in evaluation while providing consistency in evaluation of students, and they provide classroom teachers with valuable information about student progress.

Project-Based Learning in Internships: Rindge School of Technical Arts

Juniors and seniors at the Rindge School of Technical Arts (RSTA), a school-within-a-school in Cambridge, Massachusetts, can select from several different internship programs offered by the school, in collaboration with area businesses and community organizations. Internship opportunities include early childhood and elementary education, health sciences, financial services, and facilities maintenance. Students spend half their day in structured internships and attend a seminar that meets at the work site (often jointly taught by RSTA faculty and community partners). For example, students in the "careers in education" program are team-taught by a faculty member from the school's English department and by a professor of education from Lesley College. All students in a seminar are enrolled in the same internship program, although their job descriptions cover a broad range of responsibilities and interests.

During the seminar, students critically examine their experiences in the workplace. They discuss work relationships and activities, explore the purpose of their work and the purpose of the organiza-

tion in which they work, and connect their experiences to broad themes in the humanities, such as identity and the relationship of individual to community.

In addition to personal journals, mini-projects, and other academic assignments, each student is expected to complete a major project that emerges from his or her interests and makes a contribution to the work site or the community. In concert with their internship seminar teacher and their work-site supervisor, students develop project topics that relate to their work and that will help them gain knowledge and skills. Students have developed projects that deal with a variety of problems: conflict resolution in the classroom (for the elementary education internship), one company's compliance with the 1990 Clean Air Act (for an internship in facilities maintenance), and viral meningitis symptoms (for the health internship). Mini-projects and targeted lessons throughout the year give students the opportunity to practice skills and gain knowledge that will be critical for the final project. For example, a lesson on flow charts makes it possible for all students to diagram work relationships at the work site.

Students make final presentations to peers and work-site supervisors and draw upon their written papers, journals, and site logs. Students must explain to their audience the knowledge and skills gained through completing the project, how the project is a contribution to the work site, and the process by which they developed the project idea and ushered it through to completion. Assessment is completed by seminar teachers, who incorporate evaluations completed by supervisors.

HIGHLIGHTS

Seminar is co-taught by academic faculty and work-site partners who incorporate real-world strategies and concerns.

Work-site partners and teachers work together to help students determine the structure and content of their projects, ensuring that projects reflect real-world problems and meet academic learning standards.

"Mini-projects" develop students' organizational and research skills, preparing them for a complex culminating project on a topic of their choice.

Journals and discussions focus students on critically examining their work sites.

DISCUSSION TOPICS

Integration into the Classroom, Coordination with the Work Site

In the examples discussed in this section, students are not simply sent out to work sites. To ensure a high quality learning experience, these programs use learning plans or projects to structure and enrich the students' experiences. Each approach has different implications for the kinds of learning available to students and the level of integration with the classroom.

Integration into the Classroom

Learning plans make explicit the opportunities to learn that are available in the workplace. They can be used to "bump up" the expectations of a supervisor, who may not have considered the range

of tasks a young person can do. They may prompt a supervisor to vary the scope of a student's work within one department, or they may prompt the addition of rotations throughout a work site so that a student can gain exposure to other departments and additional knowledge and skill requirements.

Boston's ProTech provides a highly structured model for teacher/student/supervisor interaction around the learning goals of the work-site experience. Staff have devised a two-year process for development of the learning plan and assessment of student work: although students begin their placements in January of their junior year, the learning plan is not completed until the summer, after the student has completed several months of the internship. This ensures that the learning plan accurately reflects the student's capabilities. At the beginning of their senior year, students participate in a formal evaluation of their progress towards learning goals, and at their end of their senior year they undergo a final review. The supervisor, teacher, and student meet at that time to use the learning plan as an assessment tool to evaluate the student's progress toward goals.

However, learning plans alone are not sufficient to ensure integration with the classroom. It is possible for a high-quality internship to feature well-designed learning plans that remain completely separate from students' academic experiences. ProTech is developing a unique model for use of the learning plan to inform curricula. In their new design, teams of teachers and employers are currently developing a common assessment rubric for school and work that is aligned or consistent with the Boston Learning Standards. In 1998-99, teachers will pilot the rubric in their classroom as

a formal means for bringing real-world skills into their curriculum. Teachers will be able to analyze their students' progress—as a group—on meeting the SCANS skills contained in the rubric, and target their curricula accordingly.

Alternatively, while projects do not impose a structure on student experience in the workplace, they do offer greater opportunities for the integration of a broad range of academic, technical, and vocational skills and knowledge from both the work site and the classroom. For example, internship projects can be structured to require development of a technical and/or academic skill, and many projects require completion of a written product. A science teacher with students interning in health settings can assign projects that require a specific scientific methodology and necessitate understanding of particular medical concepts; a math teacher can require the production of a written product demonstrating the application of algebraic concepts along with appropriate use of English.

Coordination with the Work Site

Since supervisors are familiar with developing job descriptions, most find it relatively easy to develop learning plans for students. The role of a supervisor in assisting students with a project is far more complex. While a learning plan can be developed at the work site by the supervisor in consultation with the student, defining and implementing a project requires a more complex set of negotiations between the student and supervisor, and often among the student, a teacher, and the supervisor. Supervisors may be asked to play an ongoing role in coaching students, as well, assisting them in locating

workplace resources (such as information, or individuals with expertise) and helping them work through conceptual issues that may arise.

If a project is to "count" for school, coordination between the classroom and work site must be ongoing and clear. Projects offer no ready-made template to guide supervisors in their new role as coach or to assist teacher/supervisor/student teams in the development of joint learning goals. The coordination problem is compounded when a teacher has multiple students doing projects at different work sites.

At Noble High School, students undertake a major portion of the responsibility for finding an internship and defining a project. In addition, students are expected to consult at least one academic teacher in a subject area that the project addresses. However, it is also true that significant teacher time is devoted to guiding students in this process, as teachers play the role of program advisors to ten students doing internship projects. At the Rindge School of Technical Arts, a larger, urban school, project topics are developed collaboratively among student, teacher, and supervisor, and both learning goals and supervisor roles are determined at that time. To facilitate this process, Rindge assigns significant time for teacher coordination.

One solution to the coordination issue is to involve students in team projects. A program with several students in one work site lends itself to this model. For example, a team of students at a hospital might explore the treatment of a pediatric illness that involves several departments (such as surgery, pediatrics, rehabilita-

tion, and social services), and produce a patient guide to services. In this case, a team of students would plan its project during class time and use hospital staff as resources (e.g., for interviews and materials), requiring less concentrated time with individual supervisors. Ensuring that the project is of value to the employer also makes it easier to get time from work-site staff.

In Boston's ProTech, coordination with the work site is accomplished by staff of the Private Industry Council (PIC), an intermediary organization. The school benefits from the significant work done by PIC staff to design the learning plans, recruit partners, and coordinate the development of individual student learning plans by supervisors, in consultation with teachers and students. As a result, not only do teachers work with a ready-made structure of learning plans, but they don't have to recruit business partners.

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II

Structuring Quality Project-Based Learning[3]

Field-based investigations are a way of making schoolwork more like work in the world outside of school. Internships structured around projects are a way of mining the intellectual potential of "real work." Whether a project begins in the workplace and connects to the classroom or moves from the classroom out into the field, it requires careful planning by teachers, students, and work-site supervisors and other community partners.

Recognizing the complexity of planning a high-quality project-based learning experience for students, Jobs for the Future has designed a process and some tools for taking teachers through the work of project design. The "Six As" is a framework for helping teachers think about key elements of best practice within the context of school-to-career.

"THE SIX As": INCORPORATING SCHOOL-TO-CAREER APPROACHES INTO TEACHING PRACTICES

Academic Rigor. Projects address key learning standards identified by the school or district and help students develop habits of mind and work associated with academic and professional disciplines.

Authenticity. Projects use a real-world context (e.g., community and workplace problems) and address issues that matter to the students.

Applied Learning. Projects engage students in solving semi-structured problems calling for competencies expected in high-performance work organizations (e.g., teamwork, problem-solving, communication, etc.)

Active Exploration. Projects extend beyond the classroom and connect to work internships, field-based investigations, and community explorations.

Adult Connections. Projects connect students with adult mentors and coaches from the wider community.

Assessment Practices. Projects involve students in regular exhibitions and assessments of their work in light of personal, school, and real-world standards of performance.

Discussing the "Six As" helps teachers think about work-based learning as more than just "students going out to work" and helps them shape their own teaching practices to include both rigor and relevance. Within this framework, the difficult work of project design begins. In this process, teachers think through a number of design considerations. These might include, for example, structural issues such as the amount of time (including classroom time) they feel they can allot to the project or issues that get at the heart of

teaching and learning, such as how the project will address key content standards and reinforce important habits of mind. These design considerations are summarized below.

DESIGN CONSIDERATIONS

Dimensions and Logistics

Consider how long the project will take.

Project-based learning requires an investment of one of the most valuable resources that students, teachers, and community partners have—time. It is thus very important to think about when project work will occur and how many days or weeks of school time and work time will be involved. A project's duration will, of course, have considerable impact on the scope of what students achieve and the depth of their learning.

Some people choose to introduce a project early in a semester and allow one day a week of class time to work on it. Others plan a project as the culminating event of a unit, planning for students to spend the requisite time in a concentrated way. Still others may choose to organize a whole unit of study around doing a project. The amount of time allotted to the field-work component will, of course, play an important role in determining the best way to organize time for a project. Community or work partners may only have certain times available for hosting site visits or meeting with students.

In an internship, the amount of time devoted to a project will probably depend on the degree to which the project makes an

important contribution to the work site. One approach Fenway Middle College High School uses is to ask the employer to agree to a basic formula whereby 80 percent of an intern's time remains devoted to daily work tasks, with 20 percent available for carrying out his or her senior project.

Carefully review both the resources and constraints.
The people involved and the energy they commit are critical to a project's success. Before launching a project, it is important to be realistic about what it will take to ensure a high level of quality student work. If students need particular kinds of information, how will they get access to it? Are there data they can find? Are there people they can interview? If students are expected to produce something like a newsletter or brochure, will they have opportunities to learn the software applications involved? Who will train them in how to do this? Projects may require investments in materials, equipment, and training.

Teachers sometimes feel discouraged by the lack of resources at their disposal. The involvement of outside partners in both field-based investigations and internship projects can help to address the resource issue. It is also important to note that resource issues do not necessarily all need to be resolved by the teacher before beginning a project. Learning to leverage available resources is a real-world skill that is valuable to students, who can make significant contributions in this regard. At Noble High School, for example, students find their own internship placements, with support from teachers.

Determine who will be responsible for the work.
A project can be done by an entire class at once. In this case, the class might break into "teams" that serve various functions; however, because all of the teams' efforts are harnessed towards a common goal, it is still a whole-class project. At the other extreme, each individual in a class can pursue an independent topic that may or may not have anything to do with what another student is doing. Between those two options are project teams that can be of almost any size, each pursuing a different project.

Content

Determine what you expect students to learn.
Projects can be a powerful context within which students develop knowledge, skills, and habits of mind and work. One of the reasons that projects remain a controversial teaching methodology is that they sometimes emphasize doing at the expense of thinking. Teachers need time in the design process to think through how they will use the project as an occasion for students both to practice their skills and to develop lifelong learning habits. Teachers also need an opportunity to look at the content standards articulated by the school, district, and state and to figure out which of these the project will address.

Carefully choose a central question.
Field-based investigations and internship projects are negotiated among students, teachers, and outside partners. This does not mean that they all have to be at the table when initial design occurs. It

does mean that the central question or issue being addressed by the project should meet three crucial tests:[4]

1. Is it of real interest to the student?
2. Does it resemble issues of concern to people in settings outside of school?
3. Does it lead to deeper understanding of a discipline?

Using these criteria, a teacher, student, or work-site supervisor could define a project, with input and feedback from the others.

Process

Consider ways for students to be supported throughout the duration of the project.

The surest way to guarantee shoddy work on a project is to give students an assignment and then expect them to turn in a finished product, assuming that in the meantime they are working completely independently. Quality project-based learning requires teachers and other adults involved in the project to plan carefully and then to work closely with students throughout the duration of the project. Students, especially those new to a project-based approach to school work, need access to content expertise and to mentoring around their skill development in order to succeed in executing complex projects.

If completing a project is thought of as building a tower, the students should act as the builders. The role of teachers, coaches, mentors, and other adults is to provide the scaffolding that allows the students to take their work to a higher level. The support that adults give to students in helping them complete high-quality

projects thus functions as the scaffolding. Below are four critical elements of scaffolding to consider during the planning and implementation of projects.

1. *Explicit Expectations and Criteria:* Students are given clear guidelines from which they can plan their projects. They know exactly when various interim work products are due; how and when their work will be evaluated; and, ideally, are involved in the establishment of the criteria for that evaluation. Guidelines for projects differ from instructions. Rather than telling students exactly what to do, they provide a clear process by which students can plan and execute their projects.
2. *Access to Essential Resources:* Teachers guide students to useful materials, people, and technology. These brokered resources go well beyond traditional information sources such as books and articles. They also include examples of other projects for students to use as models, the coaches and mentors who support the field-based elements of the project, technology necessary to the project, and any other critical information.
3. *Milestones:* Students should complete a number of products throughout the period of the project rather than just one final product at the end. Milestones have three purposes. First, they create check-in points for students to make sure their projects are on the right track. Milestones help reduce a large complex job into smaller, more manageable tasks. Finally, they make school work look more like "real" work in that projects on a job typically involve a number of discrete pieces.
4. *Ongoing Assessment and Continuous Feedback:* Directly related to milestones, an ongoing assessment gives students the information they need to complete a project that meets expectations in the given schedule. While the teacher may provide much of this feedback, s/he should not be the only source. Students should

engage in periodic, structured self-assessments of their progress. They can also receive feedback on their works in progress from coaches, mentors, and peers. More points of assessments from a greater variety of sources will create richer final products.

Below is an example of an 11th-grade project from an anatomy and physiology course at the Oakland Health & Bioscience Academy. It is offered here as an illustration of a well-scaffolded project.

Scaffolding for Student Success: Oakland Health & Bioscience Academy

Housed in Oakland Technical High School, the Oakland Health & Bioscience Academy is one of the California Partnership Academies.[5] The Health & Bioscience Academy operates as a school-within-a-school for students in grades 9–12, but most students enter in the 10th grade. The program places heavy emphasis on project-based learning. Students proceed through increasingly complex school- and work-based projects; often, their growth is measurable in their increased ability to be self-directed. In the 11th grade, students engage in a project within the context of their physiology class. The project emphasizes practical applications of technical knowledge about aspects of physiology and especially how this knowledge can be used to help people improve their health. This illustrates the fact that the health education project has a strong philosophical base: students are assessed not only on their research but on how their project has an impact on actual health behaviors. The project runs throughout the year and moves through several benchmarks along the way.

The year begins with building the knowledge and skills necessary to complete the larger project through smaller research efforts, such as a project on students' family medical histories. Then, in small teams, students choose a health issue or problem that interests them. They develop and submit a project proposal that includes the scope of the problem, their research strategies, and a list of potential resources. After completing the research requirements, each team creates a newsletter on its topic. This newsletter itself is one benchmark in the process, but teams also submit a summary of each member's role in the writing and production of the newsletter. The teams then plan and rehearse presentations that they will give to a real audience affected by their issues. The final benchmark of the project is the actual presentation to a community group. Students are graded on their health education strategy as well as their mastery of the facts of the issue.

David de Leeuw, the teacher who created this project, has tried to balance his input by providing enough structure to ensure consistency, while allowing for student creativity and individual thinking. The project is carefully structured from the beginning. While the project design allows for flexibility in terms of topic selection, the teacher sets out clear expectations regarding benchmarks that should be reached during each phase of the work. During the proposal and research phase, teams must draw on their basic knowledge about health (and the specific issue they have selected) and write a description of the scope of the problem, keeping a list of sources that will help them address it. Students must also submit individual research notebooks detailing how they used their research

time and contributed to their team's project. The newsletter each team produces must include at least one factual piece on the health issue, one article detailing a controversy related to the issue, and a human interest story. Within these boundaries, students are able to use a great deal of creativity in writing the articles and in the illustration and overall design of the newsletter. Finally, teams must deliver a content-rich and engaging presentation to an audience made up of people who are affected by that particular issue. As with the newsletter, these presentations are graded on their educational impact as well as their demonstration of content mastery.

Adult support for this project extends well beyond the classroom teacher and other Health & Bioscience Academy staff. Students work with outside experts in all but the very earliest stages of the project. As the students finish their project proposals, the teacher, Mr. de Leeuw, recruits an industry coach for each team. The teams' project proposals are used to attract experts in the specified problem areas. Throughout the remainder of the project, the coach meets with the teams to review their research findings, suggests additional areas of research, and helps them anticipate questions their audience may ask. When the students move to planning their final presentation, they are helped by a new set of experts: people who work at organizations, such as the Red Cross, that provide health education services.

ASSESSING PROJECTS THROUGH THE "SIX As"

Once teachers, students, and partners have designed a project, they can return to the "Six As" as a way of evaluating the design.[n] At that point, project planners find it helpful to ask themselves a series of questions to see how well the project addresses each of the six elements. If a project is weak in certain areas, this reflection process can lead to possible enhancements of any missing elements.

Academic Rigor

- What is the central problem or question addressed by the project?
- What knowledge area and central concepts will it address?
- What habits of mind will students develop? (e.g., concern for evidence, viewpoint, and cause and effect; precision of language and thought; persistence)
- What learning standards are addressed through these projects? (Cite the source, e.g., district, state, or national)

Authenticity

- Where in the "real world" might an adult tackle the problem or question addressed by the project?
- How do you know the problem or question has meaning to the student?
- Who might be an appropriate audience for the students' work?

Applied Learning

- What will the students do to apply the knowledge they are learning to a complex problem? (e.g., design a product, improve a system, organize an event)

- Which of the competencies expected in high-performance work organizations will be developed through participation in the project? (e.g., work in teams; use of appropriate technology; clear communication of ideas; collection, organization, and analysis of information)
- Which self-management skills does the project require students to use? (e.g., developing a work plan, prioritizing work, meeting deadlines, identifying and allocating resources)

Active Exploration

- What field-based activities does the project require students to conduct? (e.g., interviewing experts, participating in a work site exploration)
- Which methods and sources of information are students expected to use in their investigations? (e.g., interviewing and observing, gathering and reviewing information, collecting data, model-building, using on-line services)

Adult Connections

- Do students have access to at least one outside adult with expertise and experience relevant to their project who can ask questions, provide feedback, and offer advice?
- Does the project offer students the opportunity to observe and work alongside adults during at least one visit to a work site with relevance to the project?
- Does at least one adult from outside the classroom help students develop a sense of the real-world standards for this type of work?

Assessment Practices

- What are the criteria for measuring desired student outcomes? (e.g., disciplinary knowledge, habits of mind, applied learning goals)

- Are students involved in reviewing or helping to establish the project criteria?
- Which methods of structured self-assessment are students expected to use? (e.g., journals, peer conferences, teacher or mentor conferences, rubrics, periodic reviews of progress)
- Do students receive timely feedback on their works-in-progress from teachers, mentors, and peers?
- What work requirements are students expected to complete during the life of the project? (e.g., proposal, work plan, reflection paper, mini-presentation, models, illustrations)
- Do students prepare a culminating exhibition or presentation at the completion of the project that demonstrates their ability to apply the knowledge they have gained?

Applying the "Six As": North Clackamas, Oregon

The North Clackamas School District has committed to expanding and improving teachers' use of project-based learning, and it has devoted extensive resources to professional development in order to do so. "This kind of professional development needs to be done in a sustained way; it cannot be a one-shot deal," explains Michelle Swanson, a national expert on project-based learning who has been working with the school district to implement this change. As a consultant to Jobs for the Future, Swanson has helped to design a sequence of professional development activities that leads teachers through a process of creating and refining projects. Central to this process is the use of the "Six As" as a tool for assessing the quality of the projects. The following are examples of how North Clackamas teachers have applied the "Six As" to their project work:

At Milwaukee High School, two teachers team-teaching the honors American studies course wanted to revitalize the course's research project. In its original form each student was asked to choose an event in twentieth-century United States history and complete a research paper on that event. While the quality of the papers was acceptable, the teachers felt that the work was perfunctory.

They reviewed the "Six As" and examined the **authenticity** of the project by asking themselves, "What does the research serve? Which audiences can it reach?" The teachers asked people who perform similar historical research these same questions. The teachers realized that historical research reaches a number of audiences in a variety of ways beyond the traditional research paper, from scholarly trade publications and monographs to lectures and videos. These discussions led teachers to reformulate the assignment in such a way that would push students to a greater (and more interesting) challenge.

Students must now create an abstract of their key findings, as historians do. Because students had to learn how to identify, organize, and summarize their most important findings, this task has proven to be quite challenging for the students, thus increasing the **academic rigor** of the project. Then, the students engage in **applied learning** as they develop presentations with display boards or overheads they have made using Power Point (a computer program). At the conclusion of their program, they present key findings in oral presentations at a symposium attended by the students and their parents. In the future, the teachers are hoping to increase the **adult connections** in this project by increasing the ongoing involvement of professional historians who can offer both content and process expertise.

A Rex Putnam High School special education resource teacher implemented a project in which her students constructed a nature trail around the perimeter of the campus. The next logical phase of the project articulated by both the teacher and her students was to focus on wildlife habitat restoration around the trail. With the aid of the "Six As," she focused on the real-world problem of the destruction of bat habitats in northwest Oregon. Her initial idea included an investigation of bats, which included exploring concepts about habitat, ecosystems, and endangered species; finally, it included a project to restore the local bat population. She involved a professional bat keeper from the local zoo in this work to provide an **adult connection** for the students.

Despite meeting her initial goal, the teacher realized that this project had even greater potential. She decided to have the students develop and teach lessons on bats and habitats to elementary school students. Her students created lessons for both primary and upper elementary students. The work with the younger children was an introduction to the concept of habitat. With the older children, the high school students went deeper into environmental issues and facilitated a mini-project of building and placing bat boxes.

This work in elementary schools provided a deep layer of **active exploration** and **authenticity** to the project as well as **adult connections** to the elementary school teachers who assisted in the development of lesson plans. Already a team problem-solving effort, the project had more **applied learning** elements when the students had to communicate their skills and knowledge to others. The **academic rigor** of the project was similarly increased now that it called for

greater reading comprehension, oral communication skills, and written expression. Finally, the teacher changed her assessment practices by developing a rubric that measured student achievement in all aspects of the project.

While the projects listed here are all field-based investigations, it is important to remember that the "Six As" can be as easily applied to internship projects. To do that, the teacher, work-site supervisor, and student can meet to review the student's proposed project. Looking through the lens of the "Six As," they can see if the project meets the standards of the school and workplace and advances the student's personal development goals.

III

Key Ingredients for Reaching All Students

Most school systems that recognize the pedagogical value of work-based learning experiences have managed to provide them for only a limited number of students. This can be problematic, not just because of the limited reach this implies (in terms of both standards and community but also because such experiences are difficult for lone teachers to sustain). Without logistical and administrative support for making connections to the world beyond the classroom, teachers may well throw up their hands and revert to more traditional classroom activities.

This chapter discusses the critical elements—the "architecture"—necessary to provide work-based learning opportunities on a large scale. In understanding these elements, it is helpful to look at the experiences of individual schools, such as Fenway Middle College High School, that have undertaken significant reorganiza-

tion to provide work-based learning opportunities for a large portion of the student body. It is also important to review what happens when a district tries to address the school restructuring and community-wide organizational challenges of opening up such opportunities to all students.

Since 1994, school districts in five communities—Boston, Louisville/Jefferson County, Milwaukee, Philadelphia, and North Clackamas, Oregon—have worked in partnership with Jobs for the Future to make the systemic changes involved in standards-based, school-to-career reform. Through this work, JFF has identified a number of key elements of a successful district-wide initiative. These include a community-wide strategy for organizing business partnerships, in-district capacity to advocate for and manage both the involvement of external partners and school restructuring efforts, school accountability and student assessment systems that promote contextual pedagogies, and a concerted strategy to change teaching practices. These multiple levels of support and coordination are discussed below.

ORGANIZED AND COMMITTED WORK-SITE AND COMMUNITY PARTNERS

Leadership, Intermediaries, In-District Coordination

Both Boston and Philadelphia have enjoyed a rapid increase in the number and quality of work-based learning opportunities in recent years. Both communities have adopted a three-part strategy to

organize employer involvement in schools to promote work-based learning. Components include:

- a high-level leadership body to lend the initiative guidance and clout and to lead the recruitment of employers for work-based learning opportunities
- a strong intermediary to organize and support the employer community
- an in-district body to oversee implementation of supporting structures, such as career pathways, and to ensure coordination between schools and work sites

This "three-legged stool" of an organized employer community takes the onus off teachers and other school-based staff to contact, cultivate, and develop curricula with local employers.

Leadership

In an emerging pattern in a handful of districts, high-level leadership bodies offer schools a variety of resources, such as a cadre of school volunteers or internships for qualified students, in order to encourage structural and pedagogical changes. In both Philadelphia and Boston, these leadership groups understand and advocate a connection between an improved education system and the long-term economic health of the community, and they are forming partnerships with schools to increase the number and quality of work-based learning opportunities available to students. In Philadelphia, lead businesses such as CoreStates Bank have made available tutors, mentors, and work-based learning placements. In Boston, employers provide job-shadowing opportunities to thousands of students and paid internships for hundreds.

Boston provides a powerful lesson on the role of a leadership body in maintaining the focus on school reform over the long term. Despite regular turnover in the superintendency, Boston has maintained and even escalated its work-based learning opportunities because of the presence of a highly organized business community that supports continued involvement in school-to-career efforts. Many of those communities which have not successfully leveraged the commitment of the business community have lost momentum in the long run due to changes in school leadership.

Intermediaries

In a small town with a single high school, one individual—or intermediary—can accomplish the task of reaching out to employers and generating work-based learning opportunities. In large-scale efforts, employer involvement must be organized. Staff must be designated to recruit new business partners, coordinate their involvement by ensuring that businesses are matched with appropriate school programs, certify the appropriateness of work-based learning opportunities, and, in the case of internship programs, coordinate preparation of students for placement at the work site. Intermediaries also usually work with district staff to organize and coordinate the work of the leadership body.

Many communities look to an established organization that enjoys credibility with the employer community to function as an intermediary. In Boston and elsewhere, the Private Industry Council (PIC) has played this role. Elsewhere, no such established organization exists, or the "playing field" is crowded with many business-

related organizations, each with a slightly different mission. Selecting one to lead the community-wide effort to promote work-based learning could prove to be politically difficult. In this case, the school department might set up an internal agency to play the intermediary role. If so, one caveat is in order: an in-district body must be seen by the community as a streamlined, efficient entity, autonomous from the school district itself; otherwise, there may be concern that this body will be mired in school department politics.

In the absence of an existing intermediary, Philadelphia has created a unique in-district office, called the Employment Services Unit, that successfully recruits and supports employer involvement in work-based learning (primarily internships). Although situated inside the Philadelphia Public Schools and staffed with district employees, the unit is accountable to the School-to-Career Leadership Council, an independent consortium of business and community leaders. Within the unit, business relationship managers recruit in particular industry areas corresponding to local areas of labor market growth and ensure that work placements are worthy of academic credit. A support-services team is responsible for screening high school students by conducting a series of mock interviews, checking students' attendance records, and completing a detailed assessment of each student.

Cambridge, Massachusetts, looked to city government to organize its employer intermediary. The Office of Workforce Development, housed in the city's Department of Human Service Programs, recruits businesses for involvement in internship programs, collaborates with Cambridge's high school and area community

organizations to spearhead new school-to-career initiatives, and coordinates the public- and private-sector summer jobs campaign.

In-District Coordination

In small communities with one or two high schools, work-based learning may be coordinated internally by teaching staff with release time devoted to the effort. In Berwick, Maine, Scott Eddleman, a science teacher at Noble High School, was given grant-funded release time to coordinate internships.

Those large school districts that have been most successful at implementing work-based learning on a large scale have benefited from a centralized, internal office devoted to the effort. Such an office can drive the work-based learning agenda within school districts by prodding and assisting schools to reorganize into small learning communities, developing career pathways, and organizing professional development opportunities through which teachers learn to design field experiences. In some communities, this department partners with the employer intermediary to ensure coordination of work-based learning opportunities across schools. In Philadelphia, the district's Employment Services Unit fulfills both functions, while in Boston, the school department's Office of School-to-Career works closely with the PIC to oversee school-to-career efforts in the schools.

In many communities, the internal coordinating body advocates for and organizes the work of school-based school-to-career coordinators (described below). It may offer ongoing networking sessions to share resources and trouble-shoot concerns, create common tools

for employer recruitment or to structure work-based learning, secure funding for full-time coordinators in the schools, or provide professional development on common themes.

Key District and Community Components to Support Work-Based Learning

- a strong leadership body to serve as advocate and guardian of the change process
- a staffed intermediary organization to facilitate employer and community involvement
- new central-office and building-level staff roles (facilitator, implementor, entrepreneur) to organize the change process and help connect learning in the classroom and community
- high common standards for academic and work-based learning
- school accountability systems, standards, and student assessment measures that align with the pedagogy of school-to-career, such as standards that emphasize the use of academic knowledge in real-world settings
- strategic use of professional development to help teachers implement new pedagogies
- district commitment to collect data needed by schools and their partners to evaluate impact of school-to-career learning practices on student achievement and to improve performance

STRUCTURAL CHANGES AT THE SCHOOL LEVEL

Staffing, Small Learning Communities, Graduation Requirements

Staffing

Schools that have managed to develop significant collaborations with business/community partners often have done so through the efforts of a "school-to-career coordinator" who is not bound by a teaching schedule and can focus efforts on supporting teachers and organizing community involvement in work-based learning activities. JFF and its partnering districts have found that school-to-career coordinators are most effective when they are full-time or close to full-time, have a good working relationship with their principal, and are involved in central school-wide policy decisions around school structure and learning goals. In this way, school-to-career coordinators ensure that work-based learning goals are consistent with the learning goals of the school and that school structure supports community-based experiences. For example, school-to-career coordinators in Boston work closely with administrators and guidance counselors within their schools to make sure that Career Pathways teachers have common planning time to do cross-disciplinary projects with community partners. Coordinators in other communities also serve as work-based learning "entrepreneurs," bringing together teachers and community partners to co-develop projects.

Small Learning Communities

Many schools have found scheduling and curricular flexibility by dividing into smaller, autonomous learning units consisting of small, heterogeneous groups of students who stay together for two to four years, clustered into courses with a stable group of teachers. A small learning community (SLC), freed from the dictates of a large high school's lock-step organization, is often better able to establish a flexible schedule that allows time for student participation in internships and helps facilitate academic–work-site integration through project work; this involves creating opportunities for adults to provide coaching to students on projects. A small learning community allows the school schedule to follow the dictates of students' experience—in the work site or in completing projects in the community—rather than the other way around.

The basic structure of a small learning community can also allow teachers to collaborate with one another much more than is common in large high schools. Many of these learning communities have common planning time during which teachers can share the task of coordinating with community partners. In schools that are not organized as SLCs, teachers are forced to squeeze time in the school day between their many other tasks—such as teaching, lunch duty, administrative tasks—and partnerships with the community can easily fall by the wayside.

Schools implement small learning communities in a variety of ways. While some cluster students for two years, others cluster for three or even four years; some involve students in only two common classes, while others involve students within a cluster in all common

classes. Many schools have found it easiest to start with clustering students in lower (9th and 10th) grades only—perhaps because clustering is akin to the structure of many middle schools, which group students into small, often disciplinary teams.

At Noble High School, freshman and sophomore students are grouped into teams of 80, each of which consists of a science, math, English, and history teacher, a guidance counselor, and an elective teacher. Teachers within teams have common planning time, during which they make contacts with community partners and develop interdisciplinary project-based curricula. Upper grade students at Noble are not clustered but do participate in a required two-year seminar course, which is team-taught and project-based and which serves as a vehicle for students to prepare for the school's "senior celebration" featuring exhibitions of student work achieved through projects.

Similarly, at Central Park East Secondary School, students are clustered through Grade 10, with a common core curriculum organized around mathematics, science, and humanities. All students complete a community service requirement in the lower grades by doing an internship at a non-profit or public sector organization. At the end of 10th grade, students enter the senior institute, where they are expected to complete a prescribed set of portfolios, exhibitions, and competencies for graduation. Graduation requirements include a work internship and a senior project.

Hoover High School in San Diego combines lower grade clustering into families to allow for interdisciplinary instruction and a smaller, personalized environment, with full upper grade clustering

around career themes. The 9th- and 10th-grade families feature hands-on, interdisciplinary curricula, career exploration, and community service. Upper grade students select one of three theme-based schools (the School of Health and Human Services, School of Business and Communication Arts, and School of Design and Engineering Technology) featuring core academic courses, specialized technical courses, and internships.

Small learning communities organized around career themes, such as at Hoover, provide coherence to the curriculum, infuse real-world standards derived from career fields across the curriculum, and give community partners a context for connecting with the school. Career themes can be broad enough so that students in different clusters are learning roughly comparable, broad, transferable academic and SCANS skills required for success in both post-secondary education and high-skills careers. Other career themes found in a number of schools include arts and humanities, business and finance, and environmental science.

Fenway Middle College High School provides a bold version of career-based clustering, with the entire school divided into four-year "houses," each of which is affiliated with a business partner. Students progress through a sequence of job shadowing, rotations, and internships throughout their four years in a house. During all four years, teachers regularly integrate real-world contexts from their partnering institution into their classrooms and, through common planning time, can brainstorm specific ways to dovetail work-related projects with their academic disciplines.

In Boston, any high school interested in implementing school-to-career as whole-school change must agree to reorganize their school into specifically designed smaller learning units called career pathways (see below for definition), organized around career themes, which cluster students and teachers over several years beginning in 9th, 10th, or 11th grade. The district's definition of a career pathway includes the requirement that students participate in a multi-year sequence of work-site experiences that are integrated with academic learning, including job shadowing, project-based learning with a field component, rotations, and internships.

Boston Public Schools Career Pathways

In the Boston public schools, a career pathway is defined as having the following components:

- a multi-year sequence of courses (minimum two years) related to the career area
- integration of at least two academic subjects per year. Integration is defined as using the industry or career area as the context for instruction and teaching subject matter through an applied, project-based approach
- career and personal development component (which includes both general career exploration and skills development as well as specialized study related to the career area)
- connection to post-secondary options
- multi-year sequence of work-site experiences integrated with academic learning

In Philadelphia, every school has divided into small learning communities, or schools-within-schools, through which up to 400 students and teachers cluster for a minimum of three courses per grade level over four years. Each small learning community has its own space, faculty, and instructional focus or theme, and several small learning communities within one school may be organized around different themes and operate with several different bell schedules. Although these small groupings are not mandated to be career-focused, an increasing number of them in Philadelphia define themselves as "school-to-career small learning communities." These are organized around career-related themes, use school-to-career approaches to instruction including contextual learning strategies, and include a sequence of industry-related courses, electives, and work-site learning experiences. Almost half of the district's comprehensive high schools have designated all SLCs within their building as school-to-career.

Graduation Requirements

Whether or not a school undertakes the significant restructuring required to divide into smaller units, it can emphasize work-based learning through its graduation requirements. An increasing number of schools, for example, require a senior project relating to a personal, career, or academic interest (completed as a graduation requirement during a student's senior year, often drawing upon more than one academic discipline) and, in many cases, they encourage teachers to use project work to fulfill the requirements of a particular discipline.

For example, at the Paul M. Hodgson Vocational Technical High School in New Castle County, Delaware, all students must complete a senior project that culminates in a research paper, an oral presentation, and a product related to their vocational specialty or interest. Each student selects a project committee for advice and guidance throughout the project, consisting of a faculty advisor, an English teacher, a teacher from the student's vocational program, and representatives from relevant industry. The project is the focus of class time in vocational courses and in their English class.

At Croton-Harmon High School in suburban New York, students design and complete a senior project that involves intensive research in the community in partnership with adults. Throughout the year, students participate in regular opportunities to reflect on their projects, keep journals, receive weekly mentoring from a teacher, and make a final presentation to a panel of students, teachers, and adults from the community.

Required projects may include those that fall under the heading of "community service learning." The Milwaukee public schools have instituted a set of graduation requirements, one of which requires students to show evidence of "community membership" through the completion of a group project that benefits the community. Several Milwaukee high schools are designing senior-year courses to enable students to complete this requirement; others are folding community project work into existing internship programs. Puyallup High School in Washington requires a service component for graduation (supported by a student-run organization called SOS—"Students' Opportunities to Serve") that connects students to

service learning opportunities, provides assistance to teachers interested in implementing contextual learning, and coordinates community involvement through a school-wide service fair.

Below is an overview of the "building blocks" of school structures that will support the integration of academic and work-based learning.

Structural Building Blocks to Support Work-Based Learning

Lower Grade Clustering: Students in 9th and/or 10th grades are clustered into small, personalized learning communities that feature interdisciplinary course work and project-based learning. Students may rotate through internships or field experiences to gain exposure to career fields.

One-Year Senior Projects: Students complete a senior project connected to an academic discipline and a business/community experience, resulting in a product, an exhibition, or both.

Two-Year Senior Institute: Students develop a personalized plan to complete, over the course of two years, a set of required portfolios and a senior project demonstrating their knowledge and skills.

Pathways: Students are clustered in several academic and technical courses with common teachers for two, three, or four years; the curriculum is organized around a career theme—or "pathway"—and students complete a required sequence of work-based learning activities that reinforce academic learning.

Internship-Centered Schools: An entire school is organized around student completion of individualized internships through which they gain and demonstrate attainment of academic and SCANS competencies required for graduation.

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Using the above building blocks, schools may use a "mix and match" strategy to create work-based learning opportunities for students. For example, Central Park East Secondary School clusters lower-grade students and requires a two-year senior institute for upper-grade students, while Hoover High School features a hybrid model with lower-grade clustering around interdisciplinary, thematic learning, and upper-grade clustering around career themes. East Boston High School clusters 9th-grade students only and offers three-year career pathways to upper-class students.

The Metropolitan Career and Technical Center in Providence is an internship-centered school; it has no regularly scheduled classes, and students spend a significant amount of time working and learning in the community. Students develop individual learning plans with their teachers and parents, and they negotiate topics for individual and group projects with their work site mentors and teachers.

The level of integration between academic and work-based learning varies with the types of building blocks a school adopts. For example, a one-year senior project is likely to be connected primarily to one academic discipline, while a two-year senior institute encourages integration of several disciplines and work–community experience through the completion of portfolios; career pathways can be structured to support integration between both internship and other work-based learning experiences and academic and technical course work.

DISTRICT POLICIES

Often, teachers and schools implementing work-based learning are operating at the margins of their school districts. As one school administrator in a small urban school put it, "We're flying under the radar by doing work-based learning. The district doesn't notice us, but neither do they help us in any way." Instead, school districts seeking to promote work-based learning need to send an explicit message through coherent district policies that enhanced work-based learning experiences are one way to reach the district's education goals while promoting authentic, applied learning.

Policies that should be aligned include student performance measures, graduation requirements, and school accountability measures. Several of the communities involved in JFF's Benchmark Communities Initiative have been successful in adopting new district learning standards and assessments that promote work-based learning approaches to instruction. These new standards and graduation requirements emphasize student use of academic knowledge in real-world settings and acquisition of cross-cutting competencies such as planning, communication, and project-design skills that are valued in high-performance workplaces.

For example, the Milwaukee district developed four graduation requirements (mathematical reasoning, scientific reasoning, communication, and community membership) that students are expected to meet through projects built around real-world problems in the workplace and community. Boston's new District Learning Standards require student products that show evidence of important skills, understandings, and habits of mind, including science presentations with real-world examples, math projects presenting real-

world problems and solutions, and career exploration projects that explore particular career fields and workplaces. Philadelphia's learning standards contain cross-cutting competencies (such as decision-making, communication, and the effective use of information technology) that are integrated into the content standards of all the major subject areas.

Even in those districts that have given some credence to alternative standards and assessments, teachers and schools still are likely to be held accountable for traditional measures such as grades, attendance, and standardized test scores. Teachers and schools are caught in the middle. There may be some talk in the district about new performance measures, and these may even be written into district-wide learning goals and graduation requirements, but the success of a school is still measured by traditional standards.

A community leadership group can play an important role in mediating this conflict. As discussed above, an effective community leadership group made up of business, higher education, community, and school partners can promote more school-to-career-friendly accountability measures and provide guidance on how schools might actually "quantify" work-based learning in the context of measuring school success. Boston's leadership group has successfully advocated the use of a two-pronged approach: the Boston public school system now flags those students who are involved in work-based learning to identify the impacts those experiences have on achievement and it has defined "levels of intensity" or comprehensiveness of student involvement in school-to-career programs (see chart below). For example, some school-to-career programs provide more structured learning experiences at a work site than do others. This way,

teachers, administrators, parents, community members, and students can accurately gauge what effect involvement in work-based learning activities is having on student achievement.

Boston School-to-Career Initiative Framework for Measuring Pathway Level of Development

SCHOOL-BASED INDICATORS

Components of Established Pathways:

- Which grade levels are included in pathways?
- What is the sequence of experiences?
- To what extent are courses integrated?

Use of Applied Learning in Classroom:

- How many teachers use project-based learning?
- To what extent do classroom activities connect learning to solving real-world problems?
- To what extent do activities integrate school and work–community experience?

Assessment Practices:

- To what extent do these practices address portfolio graduation requirements?
- To what extent do students complete products with real-world significance?
- To what extent are alternative assessment methods used?

Connection to Postsecondary Options:

- Can students earn college credits, meet course requirements or both?
- Do students have access to dual enrollment programs?
- Are exchange activities available to students?

WORK-BASED INDICATORS

Frequency, Duration, & Status of Work:

- How often and how long are students at work sites?
- What is the employment status of students?
- Is there a sequence of structured work experiences?

Role of Supervisor:

- How often does supervision take place and on what does it focus?
- What are the frequency, focus, and use of supervisor evaluations?

Established Learning Goals:

- Is the work experience structured around the 11 school-to-career competencies?
- Are the learning goals in writing?
- Are the goals incorporated in a learning plan?
- Is the learning plan used and reviewed?

Use of Project-Based Learning:

- What type of projects do students work on at the work site?
- To what degree do students' work experiences encompass project based learning?

Professional Development

Teachers who seek to ground their lessons in workplace and community problems can be hampered by several factors well beyond their control: lack of training in alternative pedagogies and limited time to work with other faculty around cross-disciplinary projects, to discuss project design ideas, and to conduct outreach to business partners. In particular, the school day is not structured to promote collaboration with other teachers or with community partners, although this is a crucial aspect of professional development. However, several communities have experimented with creative ways to tackle both time and training issues to help teachers develop and pilot work-based learning curricula.

In Boston, for example, as part of the 1997 "Summer of Work and Learning" program funded by the Massachusetts Office of School to Work, teachers were exposed to current work-site practices by working in businesses for 30 hours per week alongside their students. Teachers served as coaches at the work site, helping students create projects and tasks that would help them attain work site competencies. Teachers used the experience to develop competency-based learning plans for students in career pathways, and they simultaneously designed classroom projects, activities, and lessons that supported students' development in those competency areas. When teachers returned to school in the fall, they enriched their classroom activities with projects that were drawn from their own experiences in the work site.

Some sites have elected to meet for three or four one-day sessions over the course of a school year, which allows them to

develop a project idea at the beginning of the school year, pilot the idea, share preliminary student work with other teams midway through the year, and then view and discuss culminating exhibitions. If an entire school is organized into small learning units with regular time for teacher planning and collaboration, these sessions can be an ongoing part of the school calendar. Hoover High School, in San Diego, has configured its schedule so that teachers meet weekly to inspect student work and match it to new standards developed by the teaching staff; this schedule provides an ideal setting for ongoing professional development by seasoned staff and consultants.

In a highly rigorous model, the Technology Education Resource Center (TERC) offers a "Working to Learn Summer Institute" to teams of K-12 science and math instructors. Teachers and their business and community partners participate in a two-day introductory workshop in which the teams learn to identify the subject matter, content, and standards to be addressed. Another component is a three-day internship in which teachers become familiar with the activities of the workplace, shadow their workplace or community partner, and uncover challenging issues that address the relevant subject matter and standards. A three-day curriculum workshop follows in which teachers develop project-based curriculum units that integrate classroom and workplace activities.

For several years, the Jefferson County public schools in Kentucky have organized a teacher–business exchange program through which hundreds of teachers participate in a three-day work-site experience followed by two days of curriculum development. Teachers keep a workplace log of their observations about skills and subject

area knowledge needed in the workplace, equipment or tools that could be used to teach a skill or concept, and names of business resources who could be invited to the classroom. During a mandatory curriculum-writing in-service prior to the work-site experience, teachers are given a curriculum planning map to organize their projects. After the work-site experience, teachers spend two days developing curricula, keeping in mind targeted academic outcomes, SCANS skills, and essential questions, all of which culminate in a performance. Work sites range from newspaper offices and music schools to rehabilitation centers and printing companies.

The North Clackamas, Oregon, public schools have exposed a large proportion of their K-12 teaching staff to project-based learning techniques by training mixed grade-level "cadres" of teachers each year. Michelle Swanson, a Jobs for the Future consultant on project-based learning who has conducted the North Clackamas training sessions, says there are several benefits to training teachers from mixed grade levels together. Teachers from each grade level bring different strengths to the process (for example, middle school teachers have experience in team teaching) and can share their expertise with peers from other grade levels; also, mixed grade-level teams begin to think about sequencing skill development in a more coherent manner.

Some school districts have completed the first round of training for staff on contextual learning strategies and are moving towards identifying and training teacher coaches who can become school building leaders and assist their peers in developing work-based learning projects. In this model, teachers experienced in project-

based learning serve as teacher-coaches within their schools, helping their faculty peers to refine project designs and align projects with district and state standards and curriculum frameworks. Teacher-coaches also document teachers' processes of developing projects and assist teachers and students to share their project work within their school and with the broader community.

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Appendix

PROJECT TOOLS AND SAMPLE TEMPLATES

Below are several templates for planning and organizing projects, developed by schools and organizations to guide teachers in executing projects with their students.

Project Template: Metropolitan High School

At Metropolitan High School ("The Met") in Providence, Rhode Island, all students must compile a portfolio of completed projects through which they demonstrate proficiency in a set of approaches, technical skills, and personal qualities and goals. Projects can arise from students' work in the community or visits to work sites, or from students' personal interests. To organize their work on each project, students must complete the following template:

1. Describe the project(s).
   A. What is its value to the organization?
      What need or problem does it address?
   B. What will the intermediate and/or end product(s) be?
   C. Who is it for?
   D. When is it due?
   E. How will it be presented and to whom?
2. What does the organization look for to determine the quality of these products? How will this work be evaluated by the workplace?

3. What are the technical skills and knowledge areas required to do this work, i.e., what skills does The Met need to work on with the student?
4. What can be added to enhance the work (e.g., adding relevant reading, displaying results graphically, looking at an historical perspective, presenting a list of comparisons and contrasts)?
5. What work materials will be drafted, saved, moved back and forth between workplace and school in order to work on the project?

Six Principles for Hands-On Humanities

In "Hands On, Heads Up: Uncovering the Humanities in Work-Based Learning Programs" (a chapter of *Real Learning, Real Work* by Adria Steinberg), Rob Riordan offers the following principles for contextualizing learning in the humanities curriculum.

1. Situate students in the world beyond school.
2. Treat students' experience as a primary text.
3. Create contexts for shared reflection.
4. Practice academic and workplace skills in an adult milieu.
5. Help students encounter the world through publication, presentation, and exhibition.
6. Think of the teacher as inquirer and clinician: As an inquirer, the teacher analyzes the work or community service site for its learning potential. As a clinician, the teacher analyzes the students' journal reflections for connections to academic content areas.

The Field Study Process

The "field study process" was designed by Charlie Jett and the Critical Skills Group, Ltd., for high school students to practice work-related skills while working with a community or business partner to solve a semi-structured problem. Jett's field-study process includes the following:

Initiating the Field Study	field a team identify the parameters of the project
Planning the Field Study	identify the issues identify data collection needs brainstorm multiple sources of data send "confirmation" letter (to partner, establishing agreement on work) structure the team for maximum productivity
Collecting the Data	develop interview guides and practice interviewing techniques conduct interviews use the Internet find and use written sources of information manage the data collection process take notes and use other forms of documentation
Analyzing the Data	analyze all of the sources of data synthesize the information develop "findings" develop "conclusions" develop "recommendations"

Writing the Report	develop a structure and format for the report
	draft, edit, produce final copy
Presenting the Findings	develop an oral report with appropriate visuals
	rehearse the report
	do an oral presentation

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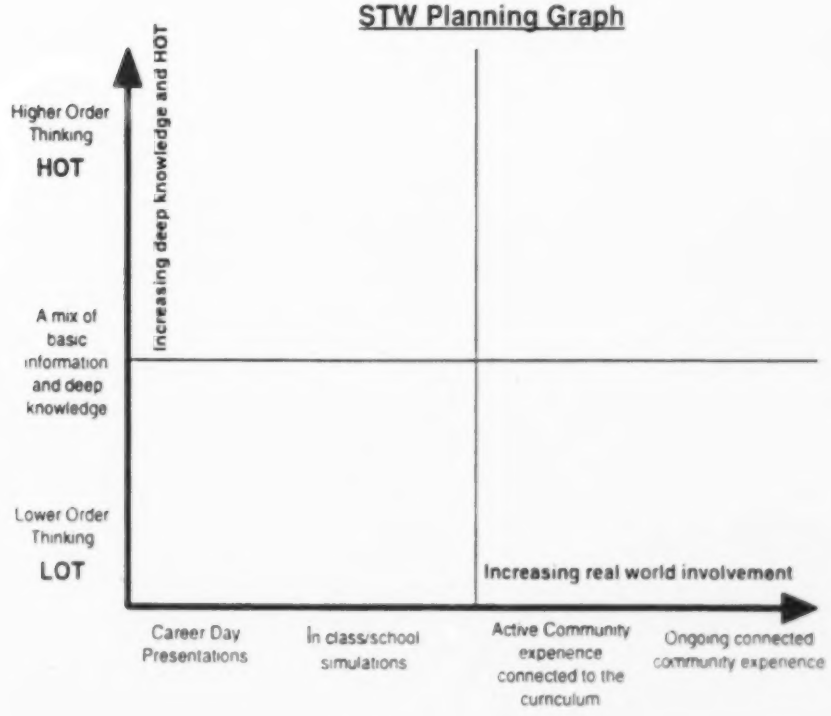
The Milwaukee Public Schools has developed a tool for teachers to plan projects that develop higher-order thinking skills *and* involve significant real-world involvement.

Higher-order thinking skills are defined as those that require students to manipulate information and ideas by synthesizing, generalizing, explaining, hypothesizing, or arriving at interpretations.

The horizontal axis shows a continuum of increasing real-world involvement. The vertical axis shows increasing higher-order thinking about deep knowledge. Activities that involve all or almost all of the students in complex problem solving using deep knowledge appear at the upper end of the vertical continuum.



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The Northwest Regional Educational Laboratory has developed a process for students to develop projects related to their work site:

Part One - Developing a Proposal

Step 1 - Get an initial idea by thinking about things that interest you about your job or work site.

Step 2 - Choose a topic from your ideas in Step 1 and reflect on what you already know about it and what you want to learn.

Step 3 - Write a proposal that describes what you will be doing for your project and why.

Part Two - Making a Work Plan

Step 4 - Create a list of products you will produce and describe how you will do it.

Step 5 - List the purposes of each product and how you will make your products useful in the real world.

Step 6 - Create a list of resources (including people, supplies, and research) you will need for your project.

Step 7 - Describe the connections your project will have with what you learn at school and the workplace.

Step 8 - Make a timeline showing how long it will take you to complete your products and put them to use.

Step 9 - Transfer your timeline to a calendar so you can keep track of your progress on your project.

Step 10 - Negotiate the assessment method for evaluating your project.

Step 11 - Sign a learning agreement that includes your roles and responsibilities and those of your teacher(s), employer(s).

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Notes

[1] This report uses the term "school-to-career" rather than "school-to-work" because the key to self-sufficiency in the labor market is the ability to advance in a career, not simply get a job. Also, the term school-to-work can misleadingly suggest a one-time transition to employment and be associated with entry-level work rather than career advancement.

[2] The Secretary's Commission on Achieving Necessary Skills. (1992). *What work requires of schools. A SCANS report for America 2000.* Washington, DC: U.S. Department of Labor. The Secretary's Commission identified foundation skills and competencies essential for today's worker and citizen, now referred to as the SCANS competencies.

[3] Much of this chapter is adapted from: Alongi, A., Arora, S., Hogan, C., Steinberg, A., & Vickers, M. (1997). *A portable action lab for creating quality projects for health care careers.* Boston: Jobs for the Future.

[4] Adapted from the Working to Learn project of the Technology Education Resource Center, Cambridge, MA.

[5] Information on this project has been adapted from: Steinberg, A. (1997). *Real learning, real work.* New York: Routledge.

[6] Ibid.

[7] From Newmann, F., Secada, W., & Wehlage, G. (1995). *A guide to authentic instruction and assessment: Vision, standards, and scoring.* Wisconsin Center for Education Research, Madison, WI.

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